BEDSIDE MEDICINE FOR BEDSIDE DOCTORS

An Open Forum for brief discussions of the workaday problems of the bedside doctor. Suggestions of subjects for discussions invited.

RELIEF OF PAIN BY SURGICAL MEASURES

I. PATHOLOGY

CYRIL B. COURVILLE, M.D. (College of Medical Evangelists, Los Angeles).—While most operative procedures are performed with the object in mind of relieving pain or discomfort, those measures directed *solely* at the relief of pain occupy a much more limited field. Pain in such cases should have certain characteristics: it should be localized or at least regionalized, must be severe and persistent, and not be amenable to other forms of therapy. Operative procedures, in these instances, have for their object the restoration of the peace of mind, the maintenance of health and the return of the patient to as nearly his normal activity as possible.

The pathology of pain in this rather varied group of conditions is too large a field to cover in any short discussion of the subject. From the standpoint of convenience, however, the lesions which cause pain may be divided into three groups: (1) Recognizable lesions, which affect the sensory nerves themselves. (2) Recognizable lesions, not primarily of the nerves but which cannot be removed or corrected by other measures. (3) Discases of nerves whose actual cause is unknown and for which no other form of therapy is of value.

Group 1. In this group there are a wide variety of lesions which may affect the sensory nerves and cause severe pain. Perhaps the most important group are tumors of the nerves themselves, either arising from the sheaths of peripheral nerves as a part of von Recklinghausen's disease, or from roots of sensory, cranial nerves, such as neurofibromas of the fifth, eighth (with pressure on the fifth), ninth cranial nerves, or the sensory roots of the spinal nerves. Amputation neuromas also belong in this class. Cervical rib may likewise be included as one of these lesions which affect nerves directly. It must be remembered, however, that not all diseases affecting sensory nerves and that may cause prolonged, severe pain, belong to the surgical group. For example, many cases of neuritis are amenable to other forms of therapy. This is also true of most instances of radiculitis, such as is caused by osteo-arthritis of the spine. One interesting feature about some of the lesions in this first group, notably tumors of the sensory roots as found in the spinal canal or cranial cavity, is that the cause of the pain may not be recognized until the operation is performed for the relief of pain; and then the tumor is unexpectedly exposed by the surgical procedure.

Group 2. The most important diseases which cause pain in this second group, in which the cause is recognized but cannot be corrected by other measures, are tabes dorsalis and inoperable carcinoma. The pain and distress of dysmenorrhea and the pain resulting from certain diseases of the bladder may also be included. Surgery is also performed in certain vascular lesions, such as thrombo-angiitis and Raynaud's diseases, to relieve pain as well as to correct or prevent other serious difficulties. It would be to no profit, were it possible, to discuss the pathology of the varied lesions which belong to this group. Perhaps of greatest importance in this connection is a discussion of the possible mechanisms by which pain is produced in inoperable carcinoma. Pain may be produced directly or indirectly. In superficial carcinomas, pain seems to be due to exposure of the terminations of the pain fibers, or by compression of the nerve endings by the tumor or its attendant edema. On the other hand, pain which is produced by carcinomas in the region of the large nerves or trunks is usually due to pressure of the bony-hard tumor masses on these trunks. At times there may be an actual infiltration of the sheaths of the nerves producing a carcinomatous neuritis. Pain may also be produced in an *indirect* way by production of marked edema, as of the arm in carcinoma of the breast, or collapse of vertebrae, as occurs in metastatic carcinoma of the spine. These secondary causes of pain are usually amenable to other forms of treatment and are not usually an indication for surgical procedures on the nervous system. Pain of tabes dorsalis sometimes requires surgical methods of relief. In this case pain is produced by an inflammatory process affecting the sensory roots. Surgical measures are not always indicated, because tabetic pains are frequently self-limited, and will disappear of themselves in most cases after proper treatment and on elapse of time.

Group 3. It is in this group that the surgical measures directed to the relief of pain have attained their greatest success since there are no other measures that are effective. This group is composed essentially of the *neuralgias* which affect particularly the fifth and ninth cranial nerves and the sciatic nerve—more rarely others, as the suboccipital nerve. The actual pathology in this condition is not known. In some clinics, where many hundreds of sections of nerves have been examined, no characteristic lesions have been found. This is true in my own experience: that in examination of sections of nerves, as of the Gasserian ganglion, removed for trigeminal neuralgia, I have failed to find any evidence of any abnormalities. The pain in these cases is evidently due to some disturbance of function which makes these nerves unusually sensitive to ordinary stimuli.

In every case, attempt should be made to classify the pain from the standpoint of its pathology, in order to intelligently plan the operative procedure.

Prognosis of Surgical Procedure for the Relief of Pain

The prognosis of a given surgical procedure which has for its primary object the relief of pain depends upon (1) the accuracy of the original diagnosis, (2) the adaptability of the operation to the particular situation, and (3) the thoroughness with which sensory fibers are sectioned.

Needless to say, accuracy in diagnosis is of prime importance. Pain which persists after the operation is frequently the result of an error in diagnosis. Such errors are usually due to too hasty a decision arrived at after an incomplete examination.

The adaptability of the procedure is likewise fundamental. For example, if a surgeon sectioned a group of sensory fibers which did not supply the affected region, or were only part of those coming from an affected lesion, pain would still persist. Similarly, to cut a nerve or a sensory tract when some other measure would relieve the pain as well as correct the original difficulty, would be most unfortunate. For example, if the sensory root of the trigeminal nerve should be sectioned through the temporal route, when the cause of the pain was a tumor in the cerebellopontile angle, the patient would still have the tumor. In considering the adaptability of a given procedure, the extent of the area involved, or the lesion giving rise to the pain, the patient's outlook as to life, and the inherent danger of the proposed operative procedure should be given careful consideration. It is very important that the surgeon who is to perform the operation critically analyze the situation confronting him before undertaking any procedure whose major object is to relieve pain.

The completeness of an operative interruption of the pain of the sensory fibers is, of course, essential. A given procedure may fail to relieve the pain because the nerves or pathways are incompletely sectioned. This may be due in some instances to the fact that the surgeon, through insufficient knowledge of the anatomy of the region, has failed to interrupt its sensory supply. It is also possible that the operative procedure has failed to entirely section the sensory fibers, as is possible in cordotomy. In this connection, the responsibility rests wholly on the surgeon, who must use sufficient judgment and care to see that the work is thoroughly and completely done.

In the last analysis, then, the prognosis in a given case rests to no small extent with the surgeon himself in his ability to accurately size up the situation, his knowledge of nerve supply, and finally of his technical skill in completely sectioning the affected nerves.

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II. DIAGNOSIS AND TREATMENT

MARK ALBERT GLASER, M.D. (727 W. Seventh Street, Los Angeles).—Pain is a form of consciousness characterized by a desire to escape or to avoid, and varies from a slight uneasiness to extreme distress or torture. It is dependent upon a derangement of functions, diseases or bodily injury. It must clearly be remembered that the threshold of pain differs in people. In addition to the pain that is relieved by surgical measures, there are pains of other types which surgery will not alleviate. Every medical means for relief, exclusive of narcotics, must first be exhausted before surgery is attempted. In questionable cases the use of spinal or local anesthesia is advised before the actual surgery is carried out. This subject is one of tremendous scope and importance, and in this limited résumé a sketchy review can only be presented. The surgery for the relief of pain is carried out by methods directed toward the cranial nerves, spinal cord and roots, subarachnoid space, the peripheral nerves, and the sympathetic system.

I. Cranial Nerves

Trigeminal Neuralgia.—Patients suffering from trigeminal neuralgia have severe attacks of sharp, shooting, lancinating pain in the face, confined entirely within the bounds of the fifth nerve distribution. These attacks last a few seconds, but may occur repeatedly over a period of several hours to several weeks. Between the attacks the patient is entirely pain-free. There are also periods of three to four months wherein greater susceptibility to the attacks exist. The pain is unilateral in distribution, rarely bilateral, and occurs equally in men and women. During the susceptible period the slightest contact, or even a draft of air may set off an attack. Trigger zones are frequently present, and there never is an area of anesthesia. The therapy consists of trichlorethylene inhalations, alcohol injection of the second and third division, and surgical avulsion of the first division, subtotal resection of the sensory root by the temporal route (preferable), and subtotal resection by the occipital route. The pain never subsides spontaneously.

Secondary Trigeminal Neuralgia.—Secondary trigeminal neuralgia may or may not assume the same clinical picture. Frequently the pain is more continuous, and the attacks are not so characteristic. The pain may be caused by inflammations about the Gasserian ganglion or sensory root, osteomyelitis, or herpes. Tumors of the ganglion, brain, or adjacent structures may also cause a neuralgia, but are usually associated with some form of anesthesia. Vascular lesions, such as aneurysm of the carotid and basilar vessels, angiomas, and thrombotic lesions, are less frequent causes. The superior cerebellar artery or the petrosal vein may directly press upon the sensory root and cause an indentation upon the nerve. Diseases, such as multiple sclerosis, syphilis, syringobulbia, dental pulp stone, impacted third molars, carcinoma, may also bring about this pain. Fracture of the skull and jaw, as well as congenital anomalies, have been reported as etiologic factors. The relief of pain is brought about by therapy directed toward the specific diseases, or by surgery upon the trigeminal nerve.

Facial Nerve Neuralgia.—Facial nerve neuralgia has been described rather infrequently, and is based upon the studies of Ramsey Hunt in cases of herpes and facial paralysis. He found the facial nerve sensory supply was situated in the tragus,

antitragus, lobule, and deep in the ear. The pain clinically simulates trigeminal neuralgia, except the distribution differs. Taylor has relieved this pain by section of the seventh nerve and the nerve of Wrisburg. Recently, Reichert has described a type of pain similar in location, but relieved by section of the glossopharyngeal nerve. He felt that this was secondary to involvement of the tympanic plexus. In view of these two opinions, the choice of nerve severance is best determined by suboccipital exploration under local anesthesia and local stimulation of these respective nerves.

Glossopharyngeal Neuralgia. — Glossopharyngeal neuralgia consists of attacks of pain quite like that of trigeminal neuralgia, but situated at the base of the tongue, the tonsillar fossa with radiation into the neck and tympanum. Trigger zones are situated in the tonsillar fossa. The pain is relieved by intracranial section of the glossopharyngeal nerve.

Ménière's Syndrome. — Ménière's syndrome is diagnosed by ringing in the ears, gradual onset of deafness, and in additional attacks of nausea, vomiting and dizziness, of such a great degree and frequency that the patient is utterly incapacitated. The site of the lesion causing Ménière's disease is thought to be in the auditory nerve and not in the end organ. The etiology is obscure. A medical treatment, consisting of a sodium-free diet with the use of ammonium chlorid, has been recommended recently, while surgical treatment has been confined to total or subtotal section of the eighth nerve.

Vagus Neuralgia.—Vagus neuralgia most commonly is referred to the superior laryngeal branch and is caused by a tuberculous laryngitis. Pain on swallowing, as well as hoarseness, are diagnostic criteria. Relief is readily obtained by alcohol injection or surgical section of this branch. Deep-seated ear pain frequently present in carcinoma of the face has been reported relieved by intracranial section of the vagus nerve. Recently anatomical studies tend to show that the vagus supplies sensory fibers to the cranial sympathetic. Section of the vagus nerve, in addition to other methods of surgery, has relieved atypical neuralgia. These last indications for section of the vagus nerve are more academic than practical, and further research must be carried out before the method may be established.

Spinal Accessory Nerve.—The spinal accessory nerve has been held practically responsible for spasmodic torticollis. This disease begins rather insidiously with a stiffness or drawing sensation of the neck; later a pulling of the head to one side is noted. The spasm eventually becomes uncontrollable, continuous and painful. The etiology is obscure, and numerous theories have been offered. The treatment consists of bilateral intradural section of the first three anterior and posterior cervical nerve roots, and the spinal portion of the accessory nerve bilaterally.

II. Spinal Cord and Roots

Chordotomy.—Chordotomy is an incision into the anterior lateral columns of the spinal cord, and is best performed at the middorsal region. This operation was first suggested by Spiller, and popularized by Martin and Frazier. Since the fibers entering the cord do not cross until they ascend several segments in the gray matter of the same side, the operation must be performed at a level at least five segments above the segmental level of the pain. If the pain is unilateral, the contralateral tracts must be sectioned; whereas if the pain is bilateral both tracts must be incised. The theoretical high level is about the sixth cervical segment, because of the possibility of phrenic nerve complications. Operations, however, have been successfully performed at a higher level. It is believed by some observers that the gray matter must be incised in order to relieve visceral pain. This operation has been successfully performed for the relief of pain in the leg, trunk and pelvis; for inoperable carcinoma of the pelvic, abdominal organs, and spine; post-traumatic root pains from gunshot wounds, gastric crises and other tabetic pains, postmyelitic root pains, and inoperable tumors of the spinal cord.

Rhizotomy.—Rhizotomy was first suggested by Abbey in 1882 for the relief of neuralgia of the brachial plexus, tumors and other segmental pains, as well as occipital neuralgias. This operation has been used more frequently in the cervical region for the relief of pain, secondary to carcinoma, because of the dangers of cordotomy. As a whole, the results have not been as classical as the original observers had hoped. In many cases the pain was not relieved. Complete anesthesia is not obtained because of the overlapping of nerve roots. Usually five laminae are removed and six roots are sectioned. In addition to pain, temperature, touch and position sense are lost. More recently Davis was of the opinion that rhizotomy failed in its purpose because insufficient roots were severed, and he advised the cutting of at least six to eight. He has been successful in obtaining relief for angina pectoris and visceral pain.

Myelotomy. — Myelotomy was first introduced by Putnam in 1934. Pain in the upper cervical region can usually be relieved by rhizotomy. Pain, however, in the arms and shoulders is rather difficult to relieve because of the dangers of a high chorodotomy, and the fact that the sectioning of sufficient roots leaves the arm useless. For this reason it was suggested that a section of the pain fibers, as they crossed in the decussation, about the central canal would relieve this pain very much as a syringomyelia. This procedure was carried out with but one death in three cases. Additional case reports, with further refinement of technique, are necessary before this procedure should be popularized.

III. Subarachnoid Therapy

Air Injections. — Air injected into the spinal canal by the lumbar route, with an equal amount of spinal fluid withdrawn, is known as encephalography. From eighty to several hundred cubic centimeters of fluid have been removed with an equal displacement of air. This method has been successfully utilized for the relief of post-traumatic

headaches and convulsive states. Encephalography is of extreme diagnostic importance in the differentiation of surgical from non-surgical lesions of the brain, as well as to establish a pathologic diagnosis in obscure neurologic conditions.

Alcohol Injections.—Alcohol was first injected via lumbar puncture by Dogliotti in 1930. He introduced from 0.2 to 0.8 cubic centimeter of pure alcohol in the spinal subarachnoid space and obtained relief from pain situated in the lumbar and thoracic region. He has reported success in cases of radiculitis, sciatica, intercostal neuralgias, tabetic crises, and all types of lumbar sacral pain, such as relieved by chordotomy. Pain which has been relieved by sympathetic surgery has also improved following this procedure. It might be necessary to carry out more than one injection, but no cases of severe motor symptoms were reported. This method, radical as it may seem, has proved quite successful in my own experience.

IV. Epidural Injections

Normal saline, antipyrene, novocain, and other solutions have been injected through the sacral coccygeal foramin for the relief of sciatica, coccydynia, and other pains. It has also been used as an anesthetic for surgical procedures.

V. Peripheral Nerves

Peripheral Neuritis. — Peripheral neuritis may be caused by exogenous toxins, such as lead, carbon monoxid, Jamaica ginger, etc.; endogenous toxins, such as diabetes, leukemia, etc.; infections, diphtheria, typhoid, syphilis, cachetic states, and tumors. The attack upon the peripheral nerve consists of temporary novocain injections, the use of alcohol and other chemicals for a longer period of time, evulsion, crushing of the nerve, and permanent neurectomy.

Occipital Neuralgia. — Occipital neuralgia is confined to the back of the neck and occipital region, and at times may be of such severity and persistence that surgery is necessary. This neuralgia may be of a primary nature or secondary to metastatic growths. Relief has been obtained by rhizotomy, excision of the spinal ganglion and section of the occipital nerves peripherally.

Brachial Plexus Neuralgia. — Brachial plexus neuralgia has been relieved by the introduction of 20 per cent alcohol into the brachial plexus. With this low percentage of alcohol, the motor tracts are not permanently affected. Rarely is neuralgia of the brachial plexus of such a severe degree that surgery becomes necessary. Cervical rib, or ribs, are probably the most common cause for brachial neuritis. In addition to severe pain, circulatory motor and sensory signs are present. Muscle and rib resection readily relieve the pain.

Intercostal Neuralgia.—Intercostal neuralgia is secondary to numerous causes, and is readily relieved by resection of the nerve, or injection of novocain and alcohol. The herpetic neuralgias are not always relieved by this method and in obstinate cases subarachnoid alcohol should be attempted. Twelfth intercostal nerve neuralgia has been reported following major operations upon the kidney. This pain closely resembles uteral colic, and is caused by injury or adhesions of the nerve. Hyperalgesia is usually present in the sensory distribution and the pain is confined to the thigh, groin, and loin. It is continuous in duration and is readily relieved by nerve resection.

Sciatica.—Sciatica may be a symptom of constitutional or systemic disease, of tumor or inflammation of the spinal cord or nerves, of derangement or inflammatory reactions about the lumbar vertebrae, intervertebral foramin, sacroiliac joint, or the result of posture. There are other cases where no definite etiology may be determined. When all other methods of treatment have proved futile, direct injection into the nerve with various solutions, such as antipyrin, quinin, or weak solutions of alcohol, have been recommended. There is some discussion as to whether the nerve should be injected at the notch, and Labat and Greene, by the use of an electrical percussion hammer, have been able to single out the component roots favorable for injection. Epidural injections and subarachnoid alcohol have also been advised. Exposure of the sciatic nerve by surgical means with the separation of adhesions about the nerve and nerve fibers has been suggested by Babcock. Before any of these methods should be attempted, all medical measures should be exhausted. Successful relief of sciatica has been obtained in all of the above methods, and the choice is dependent upon each particular case. It may be necessary to use one, or all of these methods before relief results.

Sensory Nerves of the Perineum. — Sensory nerves of the perineum have been sectioned for certain irritative and painful lesions of the female genitalia. These conditions are associated with kraurosis, leukoplakic vulvitis and pruritus of the vulva with or without lichenification. The superficial branches of the perineal nerves, the pudendal branches of the small sciatic nerves and, if necessary, the dorsal nerves of the clitoris are sectioned.

Meralgia Paresthetica. — Meralgia paresthetica without doubt is due to a neuritis of the external cutaneous nerve of the thigh. The pain is burning, tingling, sticking, annoying rather than acute, and at times is incapacitating. It is present upon standing or walking, and is relieved by lying down. There may be a dissociation of sensation, and hyperesthesia precedes the anesthesia; in some cases the pylomotor reflex may be lost, the skin becomes thickened, the hair falls out and painful nodules appear in the subcutaneous tissue. The exact etiology is unknown, though many causes have been attributed.

Coccygodynia.—Coccygodynia may be of a true or referred type, and is caused most frequently by trauma, though arthritis and radiculitis may play a part. The pain is usually constant and confined to the sacrum; aggravated by motion and the patient is unable to sit. Upon rectal palpation the coccyx is tender. In cases of trauma, dislocation of the coccyx may be noted upon x-ray. It must be remembered, however, that the normal coccyx may appear defective. Therapy consists of

repeated epidural injections, subarachnoid alcohol and alcohol injection. If none of these methods relieve the pain, the question of resection of the coccyx must be considered. In spite of all these methods, and even with the resection of the coccyx, a cure is not always obtained and for this reason it is believed by some that the pain is psychogenic.

Pain in the Extremities.—Pain in the extremities, secondary to ulceration, which resist medical therapy or obliterative vascular disease and early gangrene, has been relieved by direct block of the peripheral nerves. The nerves which are blocked are first exposed surgically, and are the posterior tibial, deep and superficial peroneal, sural and internal saphenous.

Tumors.—Tumors, other peripheral nerves or traumatic neuromata, may occur anywhere along their respective courses, with subsequent pain. An enucleation of the pathology or, if necessary, resection of the nerve with end-to-end suture, is the method of choice.

VI. Sympathetic System

Since 1896, operations have been carried out upon the sympathetic system, primarily by such pioneers as Jaboulay, Jonnesco, Alexander, Franck Handley, and Leriche. These operations consisted, namely, of the removal of the sympathetic ganglion and periarterial sympathectomy. Royle and Hunter, in 1924, presented ramisectomy for the relief of spastic paralysis. Diez and Adson introduced ganglionectomy and trunk resection for vascular diseases. Since then the splanchnic nerves have been sectioned; operations upon the rami communicantes have been performed; the presacral nerves have been interrupted, and renal and suprarenal sympathectomy carried out. Resection of these nerves, as well as block, by paravertebral injections of alcohol and novocain have been utilized.

Migraine.—Migraine has been relieved by operations upon the inferior cervical and first thoracic ganglion. Again, the results are questionable.

Sphenopalatine and Vidian Neuralgia.—Sphenopalatine and vidian neuralgia have been treated by cocainization, alcohol injection, and removal of the sphenopalatine ganglion. If these methods failed, surgery of the sphenoidal sinus has been advised. As many of these chronic cases closely resemble, and probably are atypical facial neuralgia, relief has not always been secured.

Atypical Facial Neuralgia.—Atypical facial neuralgia is differentiated from trigeminal neuralgia in that the pain is persistent; there are never any pain-free intervals; the pain goes beyond the bounds of the trigeminal nerve, and is frequently bilateral. The continuous pain is accentuated by attacks of greater severity and lasting from several days to several weeks. The pain is difficult to describe, numerous adjectives being utilized by patients, and is deep-seated rather than superficial. It is more of a burning, aching, pressure type, rather than the acute lancinating variety. It is accentuated by general factors, such as head cold, excitement, etc., and is not relieved even by anesthesia of the given area. Sympathetic phenomena are frequently associated with this pain. Operation upon the cervical sympathetic vagus nerve, plus chordotomy, have been utilized, as well as paravertebral block. None of these measures have proven entirely satisfactory.

Angina Pectoris.—Angina pectoris has been relieved by paravertebral injection of the upper thoracic nerves, rhizotomy and operations upon the cervical thoracic sympathetic chain.

Vascular Diseases. — Vascular diseases, polyarthritis, Hirschsprung's disease, scleroderma, retinal angiospasm, post-traumatic painful osteosporosis, causalgia, angioneurosis, frost bite, Volkmann's contracture, neuritis, etc., have been relieved by ganglionectomy and trunk resection. In order to differentiate the spastic from occlusive type of vascular disease, numerous tests have been devised. By the use of typhoid vaccine, foreign protein, or simply wrapping the patient in a blanket, the temperature rise in the extremities has been measured by a thermocouple, and on the basis of the vasomotor index so established, surgery upon the sympathetic system has been indicated. Other methods of determining vasodilatation, such as nerve block, general anesthesia and spinal anesthesia (Naffziger), have been introduced. The simple emersion of the extremity in warm water, a study of the peripheral pulse volume and an oscillometric index have been utilized. Those cases of vascular disease of an occlusive nature have been treated by venous ligation. As previously mentioned, peripheral nerve block also has been used to relieve pain in the legs.

Visceral Pain.—Visceral pain, secondary to gallbladder, stomach and kidney, has been stopped by paravertebral block of the eighth to the twelfth thoracic vertebrae and splanchnic section. Peet has had excellent success in cases of essential hypertension by splanchnic section via the supradiaphragmatic route. Neuroramisectomy has been recommended for the gastric crises of tabes.

Pelvic neuralgias, dysmenorrhea, pain secondary to inoperable carcinoma of the cervix, and bladder pain of various causes have been relieved by section of the presacral nerves.

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III. SURGICAL PROCEDURES

HOWARD A. BROWN, M. D. (384 Post Street, San Francisco).—A surprising number of surgical procedures have been employed in the relief of a variety of painful conditions. The constant advance in this field of surgery has afforded immeasurable relief to chronic sufferers heretofore dependent upon the constant use of narcotics.

Probably the most widely known operation of this type is the resection, in whole or in part, of the sensory root of the Gasserian ganglion in patients with major trigeminal neuralgia or tic douloureux. The most frequent operative approach is in the subtemporal region, where a small opening is made in the bone beneath the temporal muscle. An extradural advance mesially across the floor of the middle fossa leads directly to the Gasserian ganglion and its sensory root, which is divided. The motor root, lying directly behind the

ganglion, can be spared in most instances, thus preserving the function of the muscles of mastication. Contrary to a frequent misconception, this operation does not produce facial paralysis, but results only in a complete anesthesia of one side of the face with immediate and entire relief of pain.

Alcohol injection of the peripheral branches of the fifth nerve may be resorted to in some instances; even surgical division of such branches as the supra-orbital, infra-orbital or inferior dental nerve is of value in cases in which the pain is well localized. These peripheral procedures, however, afford only temporary relief from pain which returns as regeneration of these nerves takes place. No such regeneration occurs after interruption of the sensory root of the ganglion, so that the relief of pain is permanent. Gasserian ganglionectomy is, at times, of great value in malignant growths about the tongue, lip and face, which are so frequently accompanied by severe pain. The production of anesthesia not only alleviates the pain, but also allows the attending physician to care for the surface lesions more rapidly and thoroughly without discomfort to the patient.

Glossopharyngeal neuralgia is of much less frequent occurrence, and the diagnosis is often missed. The operative treatment consists of the interruption of the glossopharyngeal nerve, which effects complete relief of pain. This procedure has been done by the extracranial as well as the intracranial approach, though the latter is the more satisfactory. The procedure is accomplished through a suboccipital opening with removal of a part of the occipital bone, exposure and elevation of the cerebellum and, finally, division of the glossopharyngeal nerve just before it leaves the cranial cavity. Following operation, the patients experience little or no difficulty in swallowing, and the patch of anesthesia in the nasopharynx and tonsillar fossa is not troublesome. This procedure also has been used for relief of pain in malignancies involving the pharynx, and the posterior one-third of the tongue.

Painful tics involving the facial muscles in convulsive, spasmodic contractions, result from certain disorders of the seventh cranial nerve. Relief may be effected in some instances by resection of small peripheral branches of the nerve, but in more severe cases resection of the entire trunk becomes necessary at its exit from the stylomastoid foramen. In these cases it is advisable to anastomose immediately the distal portion of the nerve with the hypoglossal or spinal accessory nerve, to provide for the possibility of some return of facial tone and movement at a later time.

Rhizotomy has been used for the relief of pain in several different conditions. After exposure of the spinal cord by laminectomy, the dorsal roots carrying sensation for the painful area are tied and cut just inside the dural covering of the cord. It is necessary to interrupt the roots supplying an area a short distance above and below the lesion, as well as those from the painful site itself, because of the considerable sensory overlap of these roots. The disadvantage of this procedure lies chiefly in the loss of all sensations to the affected part which, in the case of an extremity, is a great handicap. It has been used frequently in cases of malignancy, more particularly those about the neck and involving the brachial plexus. It has been of no real value in the relief of postherpetic pain or in the treatment of painful amputation stumps.

The operation of chordotomy is of more recent development than rhizotomy, and has been of much more value. It requires a laminectomy, with exposure of the spinal cord well above the site of pain; a small transverse incision is then made in the cord dividing the anterolateral tracts, which carry the sensations of pain and temperature from below. These are crossed fibers and, of course, must be divided on the side opposite to the area of pain. Frequently a bilateral chordotomy is advisable to insure complete relief of pain when one is dealing with abdominal or pelvic malignant growths. This procedure does not cause a loss of power or tactile sensation, affecting only the pain and temperature fibers, which is a distinct advantage over the results achieved by rhizotomy. When dealing with chronic pain of severe degree, the results of chordotomy have been much more satisfactory than have those of the peripheral interruption of nerve trunks. It has been successfully employed in various painful malignancies of the abdominal cavity, pelvis and rectum, as well as those involving the lower extremities. Gastric crises, painful amputation stumps, and the burning sensations occasionally present after injury to the spinal cord, frequently have been completely relieved by chordotomy. Its application to lesions of the chest and upper extremities has been limited because of the increased risk of the procedure in the cervical cord, although some cervical chordotomies without complication have been reported.

Recently an operation called myelotomy has been suggested for use in the cervical region. This consists of a midline section, paralleling the fibers of the cord and extending over a distance sufficient to include the affected segments. It has not had sufficient trial as yet to permit an estimate of its value.

Sympathectomies of various types have been employed for a variety of conditions, among which are found certain painful disorders. Interruption of the sympathetic chain in the abdominal region has been done by the transabdominal route, as well as by the lumbar extraperitoneal approach. Recently the transabdominal approach has been used more frequently. This consists of a midline exposure, retraction of the intestines, and incision of the posterior peritoneum over the sympathetic chain as it passes along the psoas muscles. The second, third, and fourth lumbar ganglia and communicating branches are completely removed, the procedure being unilateral or bilateral, as the situation demands. Dorsal ganglionectomy is accomplished through a posterior approach in the cervicodorsal region with removal of a small portion of the second rib just lateral to its vertebral attachment. The sympathetic chain is exposed along the costovertebral angle and the first and

second thoracic ganglia, and their communications are removed. These procedures have been of value in the relief of pain associated with vascular disorders, such as Raynaud's and Buerger's diseases, in certain types of painful ulcers of the extremities, in angina pectoris, and in some types of arthritis. The relief of pain, of course, represents only one phase of the application of sympathectomy.

Periarterial sympathectomy, or the stripping of the sympathetic fibers from the large arteries, has been employed to relieve pain in causalgias and cases of arteriosclerotic gangrene, as well as in the vascular diseases mentioned above. The results have not been of uniform satisfaction, and the operation at present is not extensively used.

Neurectomy, or the interruption of various peripheral nerves, has been used to relieve pain in many conditions. I refer here particularly to a most distressing condition known as causalgia, often seen after trauma to peripheral nerves, and accompanied by terrific burning sensations over the course of the nerve. Neurectomies are used in some neuralgias, for pain associated with amputation stumps, in cases of meralgia paresthetica, and for certain painful malignancies. In some cases, immediate resuture following the division of the nerve is done when one is dealing with a combined motor and sensory nerve.

During recent years a syndrome of severe pain about the neck and shoulders, and often referred down the arm, has been receiving considerable attention. This condition amounts to a mechanical or irritative type of neuritis which, in some instances, is associated with a cervical rib, but in many cases no rib is present. For this reason the diagnosis is frequently overlooked when no cervical rib is found. The operative treatment consists of a division of the scalenus anticus muscle, freeing the brachial plexus from any impingement that a cervical rib or tense scalenus muscles may be producing. Relief of pain is striking and permanent in conditions of this kind.

The subarachnoid injection of alcohol for the relief of pain has been used for the past few years. This procedure has been utilized with some success in cases of pelvic malignancy, and in painful conditions affecting the lower extremities. It consists of a careful injection of from .5 to .75 of a cubic centimeter of absolute alcohol into the subarachnoid space through the lumbar interspaces, varying from the first to the fourth. The affected side is placed uppermost and the hips are slightly elevated, allowing the alcohol to float on the spinal fluid up around the nerve roots, where its action is predominantly on the sensory elements. Occasionally, transient disturbance in the bladder or slight motor disturbances have occurred, though these have cleared up rapidly in almost all instances.

Each patient presents an individual problem, and it is unwise to recommend any of these procedures routinely without careful study of the disease as well as the patient himself. In view of the constantly increasing number of measures which are available for the surgical relief of pain, such chronic severe pain which does not respond to ordinary therapy certainly requires a careful consideration of these measures.

Federal Food and Drug Administration.—Short weight is one of the commonest violations of the Food and Drug Act. Last month five interstate shippers of foods and stock feed were fined a total of more than $500 for this type of offense. . . .

Seventeen patent medicines bearing false and fraudulent medicinal claims were seized during July, the Administration reports. Their names and the label claims alleged by the Government to be unfounded are: "Atholin," a perfumed solution of benzoic acid, salicylic acid, boric acid, aluminum chlorid and thymol in alcohol in water, offered for pimples, acne, and eczema; "Dr. Ehrlich's Nerve Tonic and Sedative," composed of phenobarbital, sodium and ammonium bromids, and water, for restoring and strengthening the nervous system, to tone the stomach muscles, create vigorous appetite and proper digestion; "Dr. Ehrlich's Tonic and Blood Purifier," containing methenamin, iron, potassium iodid, plant extractives and syrup, for rheumatism, neuritis, backache, and as a blood purifier; "Dr. Ehrlich's Kidney and Bladder Medicine," containing methenamin, iron, laxatives and water, for kidney and bladder ailments; "Hem-O-Rem," containing plant extractives, alcohol and water, for hemorrhoids; "Dr. Hubbel's Formula," composed of alcohol, water, chloral hydrate, creosote, sulphuric acid and menthol; for loose teeth, toothache, sore and bleeding gums and gingivitis (the libel further charged a violation of the legal requirement to declare chloral hydrate and alcohol, the declaration being incorrect because understated in the former instance, and lacking in the latter); "Kelp-A-Malt," essentially kelp, sugar, malt extract, cocoa, salt and saccharin, for skin and stomach troubles, anemia, nervousness and women's ailments; "Moone's Emerald Oil," described as a germicide when in fact it was incapable of killing common germs, offered for varicose veins, varicose ulcers, toe itch, and muscle, joint and nerve conditions; "Nature's Vital Food," containing ground herbs, rhubarb, sarsaparilla, podophyllum mullein, senna, water and salicylic acid, for cancers, tumors, ulcers, boils, scrofula, syphilis and all diseases arising from impure blood; "Oceanic Vitex," essentially seaweed, for headache, neuralgia, neuritis, nervous prostration, low vitality, anemia, indigestion, liver and kidney troubles, glandular disturbances, goiter, asthma, eczema, low blood pressure, catarrh, colds and influenza; "Quan-Da-Sac," consisting of petrolatum, a coal tar product and a volatile oil such as camphor, for rheumatism, deep-seated inflammation, coughs, congestion, sores, lameness, lumbago, pleurisy, bronchitis, croup, quinsy, skin affections, neuralgia and boils; "Savoy Beef Iron and Wine," for debility, exhaustion and impoverishment of the blood; "Slim," containing dinitrophenol and labeled as a safe means of weight reduction, which was untrue; "Udga Tablets," composed of baking soda, bismuth, magnesia, starch and saccharin, for acidosis, gastritis, nausea, indigestion, stomach ulcers and acid dyspepsia; "Vegetrate," tablets consisting of calcium carbonate with small amounts of laxatives, vegetable extractives and vegetable substance, for hyperacidity and deficiency diseases; "Wag's Salve," composed of petrolatum, wintergreen oil and menthol, for croup, catarrh, pheumonia, tonsillitis, chest colds and sore feet; and "Wa-Hoo Bitters," containing plant extractives, gentian, Epsom salts, salicylic acid and water, for bowel, kidney and liver disorders.

A consignment of so-called "Epsom Compound Tablets" was seized because the product was found to depend for its laxative effect upon phenolphthalein (a coal-tar product) and aloes; and "Xlent Rubbing Alcohol" was libeled when analysis showed the product to contain isopropyl alcohol rather than grain alcohol. Other drugs seized included fifteen cylinders of substandard nitrous oxid (laughing gas), substandard tincture of aconite, short weight local anesthetics in ampoules, and a consignment of eight deteriorated pharmaceuticals shipped by a salvage drug dealer in Texas.